

observed a greater number of bears in open water and on land during surveys in 1997–2005, years when sea ice was often absent from their study area, compared to surveys conducted between 1979–1996, years when sea ice was a predominant habitat within their study area. Bears in open water likely did not select water as a choice habitat, but rather were swimming in an attempt to reach offshore pack ice or land. Their observation of a greater number of bears on land during the later period was concordant with the observations of Schliebe et al. (2008). Further, the findings of Gleason et al. (2006) coincide with the lack of pack ice (concentrations of greater than 50 percent) caused by a retraction of ice in the study area during the latter period (Stroeve et al. 2005, p. 2; Comiso 2003, p. 3,509; Comiso 2005, p. 52). The findings of Gleason et al. (2006) confirm an increasing use of coastal areas by polar bears in the southern Beaufort Sea in recent years and a decline in ice habitat near shore. The immediate causes for changes in polar bear distribution are thought to be (1) retraction of pack ice far to the north for greater periods of time in the fall and (2) later freeze-up of coastal waters.

Other polar bear populations exhibiting seasonal distribution changes with larger numbers of bears on shore have been reported. Stirling and Parkinson (2006, pp. 261–275) provide an analysis of pack ice and polar bear distribution changes for the Baffin Bay, Davis Strait, Foxe Basin, and Hudson Bay populations. They indicate that earlier sea ice break-up will likely result in longer periods of fasting for polar bears during the extended open-water season. This may explain why more polar bears have been observed near communities and hunting camps in recent years. Seasonal distribution changes of polar bears have been noted during a similar period of time for the northern coast of Chukotka (Kochnev 2006, p. 162) and on Wrangel Island, Russia (Kochnev 2006, p. 162; N. Ovsyanikov, Russian Federation Nature Reserves, pers. comm.). The relationship between the maximum number of polar bears, the number of dead walrus, and the distance to the ice edge from Wrangel Island was evaluated. The subsequent results revealed that the most significant correlation was between bear numbers and distance to the ice-edge (Kochnev 2006, p. 162), which again supports the observation that when sea ice retreats far off shore, the numbers of bears present or stranded on land appears to increase.

In Baffin Bay, traditional Inuit knowledge studies and anecdotal

reports indicate that in many areas greater numbers of bears are being encountered on land during the summer and fall open-water seasons (Dowsley 2005, p. 2). Interviews with elders and senior hunters (Dowsley and Taylor 2005, p. 2) in three communities in Nunavut, Canada, revealed that most respondents (83 percent) believed that the population of polar bears had increased. The increase was attributed to more bears seen near communities, cabins, and camps; hunters also encountered bear sign (e.g., tracks, scat) in areas not previously used by bears. Some people interviewed noted that these observations could reflect a change in bear behavior rather than an increase in population. Many (62 percent) respondents believed that bears were less fearful of humans now than 15 years ago. Most (57 percent) respondents reported bears to be skinnier now, and five people in one community reported an increase in fighting among bears. Respondents also discussed climate change, and they indicated that there was more variability in the sea ice environment in recent years than in the past. Some respondents indicated a general trend for ice floe edge to be closer to the shore than in the past, the sea ice to be thinner, fewer icebergs to be present, and glaciers to be receding. Fewer grounded icebergs, from which shorefast ice forms and extends, were thought to be partially responsible for the shift of the ice edge nearer to shore. Respondents were uncertain if climate change was affecting polar bears or what form the effects may be taking (Dowsley 2005, p. 1). Also, results from an interview survey of 72 experienced polar bear hunters in Northwest Greenland in February 2006 indicate that during the last 10–20 years, polar bears have occurred closer to the coast. Several of those interviewed believed the change in distribution represented an increase in the population size (e.g., Kane Basin and Baffin Bay), although others suggested that it may be an effect of a decrease in the sea ice (Born et al., in prep).

Recently Vladilen Kavry, former Chair of the Union of Marine Mammal Hunters of Chukotka, Russia, Polar Bear Commission, conducted a series of traditional ecological knowledge interviews with indigenous Chukotka coastal residents regarding their impression of environmental changes based on their lifetime of observations (Russian Conservation News No. 41 Spring/Summer 2006). The interviewees included 17 men and women representing different age and ethnic

groups (Chukchi, Siberian Yupik, and Russian) in Chukotka, Russia. Respondents noted that across the region there was a changing seasonal weather pattern with increased unpredictability and instability of weather. Respondents noted shorter winters, observing that the fall-winter transition was occurring later, and spring weather was arriving earlier. Many described these differences as resulting in a one-month-later change in the advent of fall and one-month-earlier advent of spring. One 71-year-old Chukchi hunter believed that winter was delayed two months and indicated that the winter frosts that had previously occurred in September were now taking place in November. He also noted that thunderstorms were more frequent. Another 64-year-old hunter noted uncharacteristic snow storms and blizzards as well as wintertime rains. He also noted that access to sea ice by hunters was now delayed from the normal access date of November to approximately one month later into December. This individual also noted that blizzards and weather patterns had changed and that snow is more abundant and wind patterns caused snow drifts to occur in locations not previously observed. With increased spring temperatures, lagoons and rivers are melting earlier. The sea ice extent has declined and the quality of ice changed. The timing of fall sea ice freezing is delayed two months into November. The absence of sea ice in the summer is thought to have caused walrus to use land haulouts for resting in greater frequency and numbers than in the past.

Stirling and Parkinson (2006, p. 263) evaluated sea ice conditions and distribution of polar bears in five populations in Canada: Western Hudson Bay, Eastern Hudson Bay, Baffin Bay, Foxe Basin, and Davis Strait. Their analysis of satellite imagery beginning in the 1970s indicates that the sea ice is breaking up at progressively earlier dates, so bears must fast for longer periods of time during the open-water season. Stirling and Parkinson (2006, pp. 271–272) point out that long-term data on population size and body condition of bears from the Western Hudson Bay population, and population and harvest data from the Baffin Bay population, indicate that these populations are declining or likely to be declining. The authors indicate that as bears in these populations become more nutritionally stressed, the numbers of animals will decline, and the declines will probably be significant. Based on the recent findings of Holland et al.